

CLAIMS

What is claimed is:

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1. A method of communicating network quality of service policy information to a plurality of policy enforcement points, the method comprising the computer-implemented steps of:
creating and storing active QoS configuration information at a policy enforcement point;
receiving new configuration information and storing the new configuration information as an inactive configuration of the policy enforcement point;
determining whether the inactive configuration information is properly functional in combination with the active QoS configuration information;
making the new configuration information active in place of the active QoS configuration information only in response to receiving an activation message.
 2. A method as recited in Claim 1, further comprising the steps of creating and storing the active QoS configuration information and the inactive configuration in logically separate areas of memory of a network device that serves as the policy enforcement point.
 3. A method as recited in Claim 1, wherein the step of receiving new configuration information further comprises the steps of receiving a decision message from the policy decision point and determining whether the decision message identifies an inactive configuration
 4. A method as recited in Claim 1, wherein the step of receiving new configuration information further comprises the steps of receiving a COPS decision message from the policy decision point that identifies the configuration information as an inactive configuration by a specified message type value in a Context object that forms part of the decision message.

1 5. A method as recited in Claim 1, wherein the step of receiving new configuration
2 information further comprises the steps of receiving a decision message from the
3 policy decision point that identifies the configuration information as an inactive
4 configuration by a specified flag bit in a message type value in a Context object that
5 forms part of the decision message.

1 6. A method as recited in Claim 4, wherein determining whether the inactive
2 configuration information is properly functional comprises the steps of combining
3 the inactive configuration information with the active QoS configuration to result in
4 creating a combined configuration and carrying out one or more consistency checks
5 using the combined configuration without actually deploying the combined
6 configuration to the policy enforcement point.

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1 7. A method as recited in Claim 1, wherein making the new configuration information
2 active in place of the active QoS configuration information only in response to
3 receiving an activation message comprises the steps of:
4 receiving an empty install decision message from the policy decision point;
5 updating the active QoS configuration information using the inactive configuration
6 and thereby deploying the inactive configuration as a new active
7 configuration;
8 copying the active configuration to the inactive configuration.

1 8. A method as recited in Claim 1, wherein making the new configuration information
2 active in place of the active QoS configuration information only in response to
3 receiving an activation message comprises the steps of:
4 receiving an install named object decision message from the policy decision point;
5 installing the object named in the decision message as the active QoS configuration
6 information;
7 deleting the inactive configuration;
8 copying the active configuration to the inactive configuration.

9. A method of communicating network quality of service policy information from a policy server acting as a policy decision point to a plurality of routers that are acting as policy enforcement points, the method comprising the computer-implemented steps of:

- creating and storing active QoS configuration information;
- receiving a COPS protocol decision message from the policy decision point that identifies new configuration information as an inactive configuration by a specified flag bit in a message type value in a Context object that forms part of the decision message;
- storing the new configuration information as an inactive configuration of the policy enforcement point;
- determining whether the inactive configuration information is properly functional in combination with the active QoS configuration information;
- making the new configuration information active in place of the active QoS configuration information only in response to receiving an activation message.

10. An apparatus for enforcing network quality of service policy information at one of a plurality of policy enforcement points, comprising:

- means for creating and storing active QoS configuration information at one of the plurality of policy enforcement points;
- means for receiving new configuration information and storing the new configuration information as an inactive configuration of the policy enforcement point;
- means for determining whether the inactive configuration information is properly functional in combination with the active QoS configuration information;
- means for making the new configuration information active in place of the active QoS configuration information only in response to receiving an activation message.

11. An apparatus for enforcing network quality of service policy information at one of a plurality of policy enforcement points, comprising:

- one or more network interfaces;

4 one or more processors coupled to the one or more network interfaces for receiving
5 network information therefrom and enforcing one or more network quality of
6 service policies thereon;
7 one or more stored sequences of instructions accessible to the one or more processors
8 and which, when executed by the one or more processors, cause the one or
9 more processors to carry out the steps of:
10 creating and storing active QoS configuration information at one of the
11 plurality of policy enforcement points;
12 receiving new configuration information and storing the new configuration
13 information as an inactive configuration of the policy enforcement
14 point;
15 determining whether the inactive configuration information is properly
16 functional in combination with the active QoS configuration
17 information;
18 making the new configuration information active in place of the active QoS
19 configuration information only in response to receiving an activation
20 message.

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12. A router acting as one of a plurality of policy enforcement points for enforcing one or more network quality of service policies received from a policy server acting as a policy decision point for a network that includes the plurality of policy enforcement points, the router comprising:
one or more network interfaces;
one or more processors coupled to the one or more network interfaces for receiving network information therefrom and enforcing one or more network quality of service policies thereon;
one or more stored sequences of instructions accessible to the one or more processors and which, when executed by the one or more processors, cause the one or more processors to carry out the steps of:
creating and storing active QoS configuration information;
receiving a COPS protocol decision message from the policy decision point that identifies new configuration information as an inactive configuration by a specified flag bit in a message type value in a Context object that forms part of the decision message;

17 storing the new configuration information as an inactive configuration of the
18 policy enforcement point;
19 determining whether the inactive configuration information is properly
20 functional in combination with the active QoS configuration
21 information;
22 making the new configuration information active in place of the active QoS
23 configuration information only in response to receiving an activation
24 message.

1 13. A computer-readable medium carrying one or more sequences of instructions for
2 communicating network quality of service policy information to a plurality of policy
3 enforcement points, which instructions, when executed by one or more processors,
4 cause the one or more processors to carry out the steps of:
5 creating and storing active QoS configuration information at a policy enforcement
6 point;
7 receiving new configuration information and storing the new configuration
8 information as an inactive configuration of the policy enforcement point;
9 determining whether the inactive configuration information is properly functional in
10 combination with the active QoS configuration information;
11 making the new configuration information active in place of the active QoS
12 configuration information only in response to receiving an activation
13 message.

1 14. A computer-readable medium as recited in Claim 13, further comprising one or more
2 sequences of instructions which, when executed by the one or more processors, cause
3 the one or more processors to carry out the steps of creating and storing the active
4 QoS configuration information and the inactive configuration in logically separate
5 areas of memory of a network device that serves as the policy enforcement point.

1 15. A computer-readable medium as recited in Claim 13, wherein the step of receiving
2 new configuration information further comprises the steps of receiving a COPS
3 decision message from the policy decision point and determining whether the
4 decision message identifies an inactive configuration

1 16. A computer-readable medium as recited in Claim 13, wherein the step of receiving
2 new configuration information further comprises the steps of receiving a decision
3 message from the policy decision point that identifies the configuration information
4 as an inactive configuration by a specified message type value in a Context object
5 that forms part of the decision message.

1 17. A computer-readable medium as recited in Claim 13, wherein the step of receiving
2 new configuration information further comprises the steps of receiving a decision
3 message from the policy decision point that identifies the configuration information
4 as an inactive configuration by a specified flag bit in a message type value in a
5 Context object that forms part of the decision message.

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18. A computer-readable medium as recited in Claim 16, wherein determining whether
the inactive configuration information is properly functional comprises the steps of
combining the inactive configuration information with the active QoS configuration
to result in creating a combined configuration and carrying out one or more
consistency checks using the combined configuration without actually deploying the
combined configuration to the policy enforcement point.

19. A computer-readable medium as recited in Claim 13, wherein making the new
configuration information active in place of the active QoS configuration information
only in response to receiving an activation message comprises the steps of:
receiving an empty install decision message from the policy decision point;
updating the active QoS configuration information using the inactive configuration
and thereby deploying the inactive configuration as a new active
configuration;
copying the active configuration to the inactive configuration.

1 20. A computer-readable medium as recited in Claim 13, wherein making the new
2 configuration information active in place of the active QoS configuration information
3 only in response to receiving an activation message comprises the steps of:
4 receiving an install named object decision message from the policy decision point;

- 5 installing the object named in the decision message as the active QoS configuration
- 6 information;
- 7 deleting the inactive configuration;
- 8 copying the active configuration to the inactive configuration.

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